REMARKS

The Examiner is thanked for the careful review of this application. Claims 25 and 26 have been canceled. Claims 1-3, 6-13, 16-17, and 20-22 are pending in the application.

Claim Rejections Under 35 U.S.C. §112

Claims 9 and 10 are rejected under 35 U.S.C.112, first paragraph, as failing to comply with the enablement requirement. Page 5, lines 4-5 of the specification recite "This technique avoids the need to use two layers, e.g. a hardmask and a photoresist layer, in the pattering process." Page 6, lines 8-9 of the specification recite "the method does not use standard photoresist coated on a hardmask in the patterning process." Both sentences are used to contrast the usage of a single patterning layer 104 of Figures 2B and 2C to pattern a feature, which could be a via or a trench as shown in Figure 2C to the usage of two patterning layers 14, 16 of Figures 1C-1E (prior art).

Claim 9 defines "forming a layer of photoresist material over the hardened surface imaging material," to enable "defining a trench pattern in the layer of photoresist material," after the hardened and patterned surface imaging material is used to "transfer the pattern defined in the surface imaging material to the layer of the low dielectric constant material" to "define a via therein." The photoresist layer over the hardened surface imaging material is used to etch a trench after a via is formed. This embodiment is shown in Figures 3A-3E describing a dual damascene patterning process. A single layer 104 of the hardened surface imaging material, a hardmask, is used to define a via pattern. A single photoresist layer 106 is used to define a trench pattern. Only a single layer of hardmask or a single layer of photoresist is used to pattern the via or the trench, not two layers, e.g. a photoresist layer and a hardmask layer, as described in pages 5 and 6. Using a single layer 104 to define a via pattern and a single photoresist layer 106 to define a trench pattern does not contradict the

statements in pages 5 and 6 of the specification. A similar argument can be made for claim 10, which defines the embodiment shown in Figures 4A-4E. Figures 4A-4E describe an embodiment that uses a single layer 104 of hardened surface imaging material to define a trench pattern, which is followed by using a single photoresist layer 106 to define a via pattern. Claim 10 also does not contradict the statements in pages 5 and 6 of the specification. As a consequence, Applicants request the withdrawal of the rejections.

Claim Rejections Under 35 U.S.C. §103(a)

Claims 1-3, 6-13, 16, 17, 20-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,556,812 to *Leuschner et al.*

As stated by the Examiner, *Leuschner et al.* teaches a process of patterning a low k dielectric material and the photoresist which is used to pattern the dielectric material contains silicon or can be silylated (*See*, col. 6, lines 38-48, and claim 3). The Examiner also alleges that *Leuschner et al.* teaches that after the photoresist material is applied to the dielectric material and patterned, the dielectric material is patterned using an oxygen plasma (*See*, col. 9, lines 23-25). However, *Leuschner et al.* does not teach "hardening the patterned surface imaging material so that the patterned surface imaging material functions as a hard mask", prior to etching the low k polymeric material to transfer pattern defined by the hardmask (or hardened surface imaging material), as defined in independent claims 1, 6, 11, 16, and 20. Without the hardening process, the patterned surface imaging material would erode during the etching process to transfer the pattern to low k constant polymeric material, as shown in photoresist 16 of Figure 1E. (*See*, p. 2, lines 16-20) Using an oxygen containing plasma to harden the patterned surface imaging material, to be a hard mask, allows the hardened and patterned surface imaging material not to erode during etching of low k polymeric material,

as shown in hardmask 14 of Figure 1D. A hardmask is important and needed in ensuring the pattern fidelity of low k polymeric material. (*See*, p. 2, lines 18-19)

The Examiner states that *Leuschner et al.* teaches using an oxygen plasma to etch the dielectric material; therefore, it is inherent that the oxygen plasma would lead to hardening of the silicon-containing photoresist. However, since the silicon-containing photoresist was not hardened first, prior to the start of etching the dielectric material, a portion of the photoresist would erode and the silicon-containing photoresist would not behave as a hardmask. The patterning fidelity requirement of *Leuschner et al.* is not as stringent as in the claimed subject matter. The patterning widths described in *Leuschner et al.* is a few microns, with examples ranging from 5 to 22 microns. (*See*, col. 1, lines 37, 63, col. 2, line 14, col. 4, line 18, col. 8, line 24, and col. 9, line 62) In contrast, the claim subject matter involves patterning techniques for features that are 0.18 micron and smaller. (See, p. 1, lines 13-14) Due to the large feature sizes of *Leuschner et al.*, a hardmask is not required. However, for 0.18 micron and smaller features, the patterning fidelity requirement is much higher and a hardmask is required.

MPEP 2112 IV states that "To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference." A hardmask is not described in *Leuschner et al.* and is not required by the invention of *Leuschner et al.* Moreover, there is no guarantee that exposure to an oxygen plasma as indicated in the *Leuschner et al.* reference would sufficiently harden the silicon-containing photoresist so that it functions as a hardmask. For example, the power or the chemistry of the oxygen-containing plasma could be such that insufficient hardening occurs. Therefore, the Examiner has not established that the *Leuschner et al.* reference inherently includes a silicon-containing photoresist that has been hardened so that it functions as a

hardmask. As a consequence, Applicants submit that independent claims 1, 6, 11, 16, and 20 are patentable over *Leuschner et al.* and request withdrawal of the rejections.

Claims 2, 3, 7-10, 12, 13, 17, and 21-22 are dependent claims of independent claims 1, 6, 11, 16, and 20, respectively. Based on the arguments above for independent claims 1, 6, 11, 16, and 20, claims 2, 3, 7-10, 12, 13, 17, and 21-22 are also patentable over *Leuschner et al.* As a consequence, Applicants request the withdrawal of their rejections.

Conclusion

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of pending claims 1-3, 6-13, 16-17, and 20-22. Applicants respectfully submit that these claims are in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested. In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 774-6924. If any additional fees are due in connection with the filing of this paper, then the Commissioner is authorized to charge such fees to Deposit Account No. 50-0805 (Order No. LAM1P111.CIP).

Respectfully submitted,
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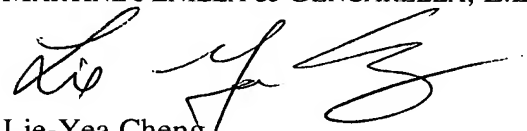

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